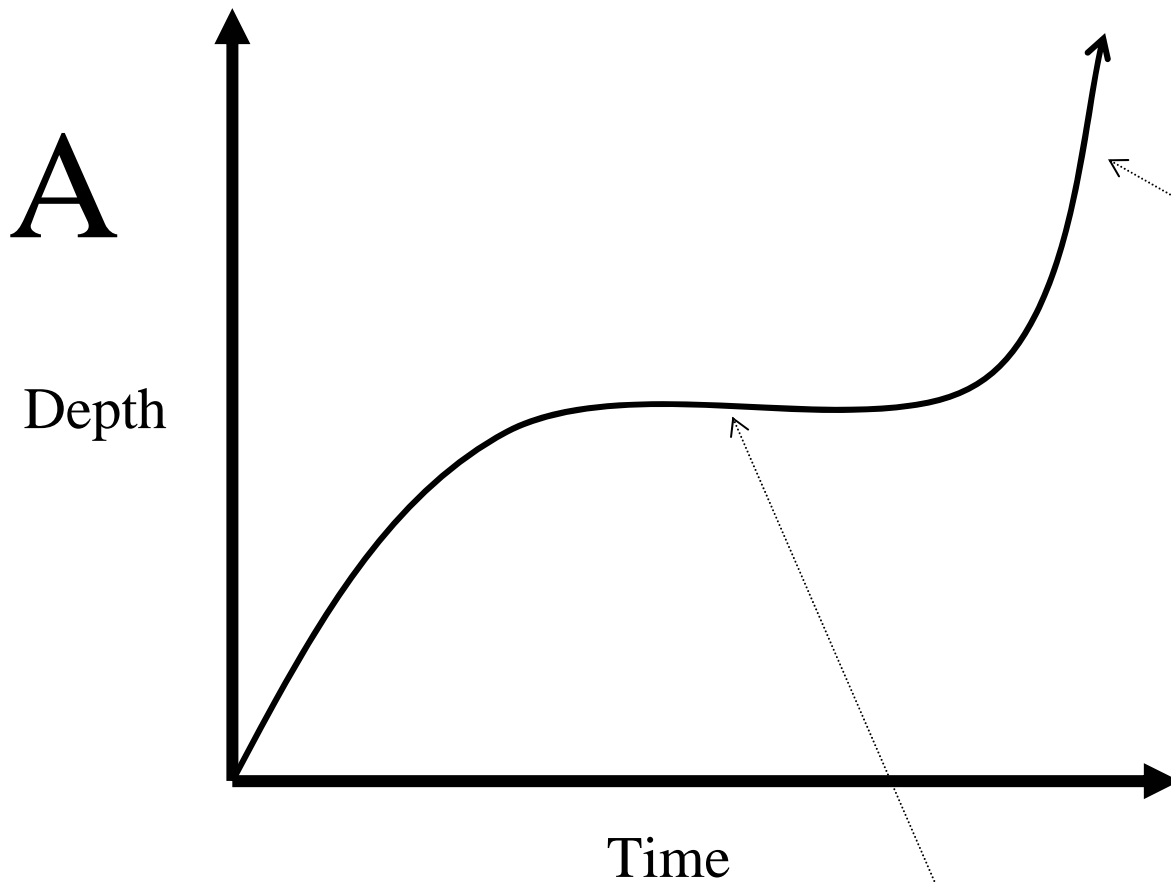


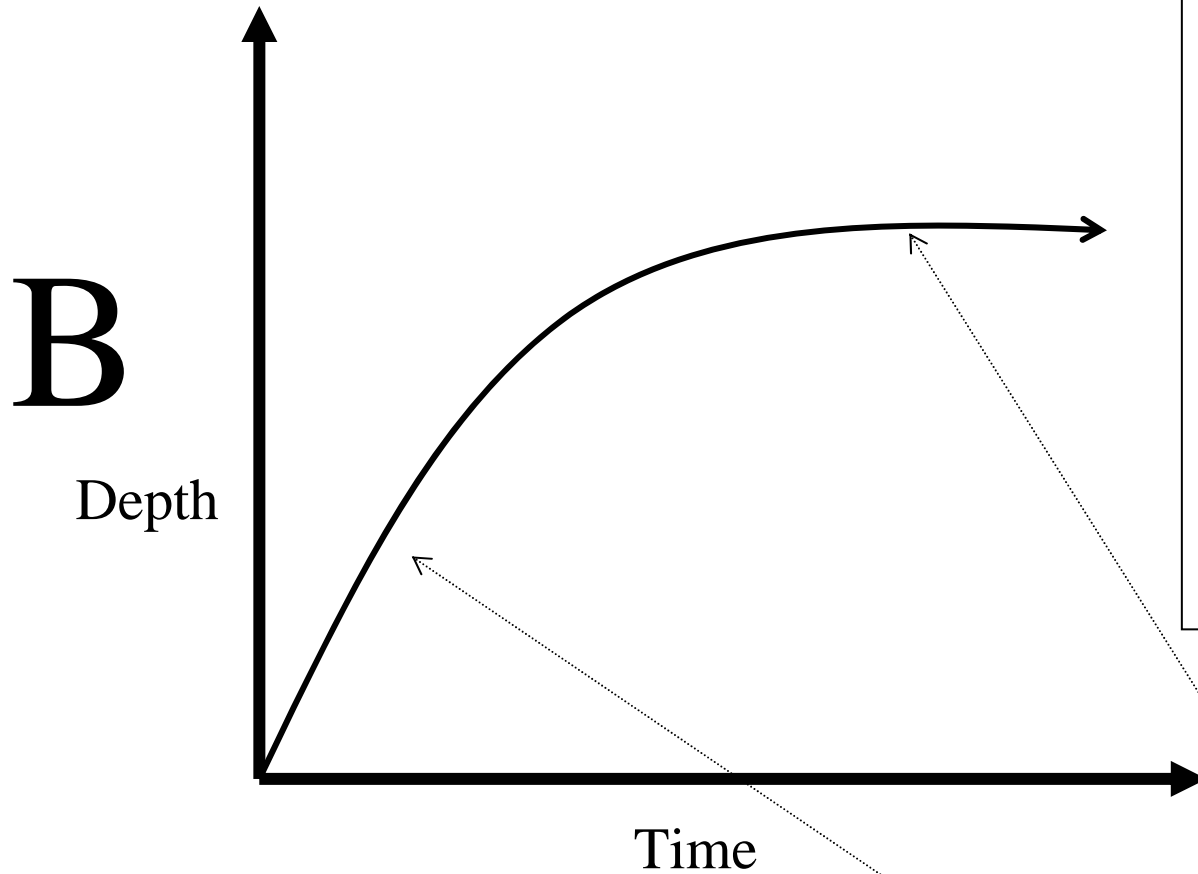
Water is poured into an empty cylinder at a constant rate.

Which graph models the level of the water in the cylinder over time?



No. This graph shows the depth suddenly increasing. This doesn't make sense because the pitcher from which the water is poured will run out of water, meaning that the depth will no longer increase.

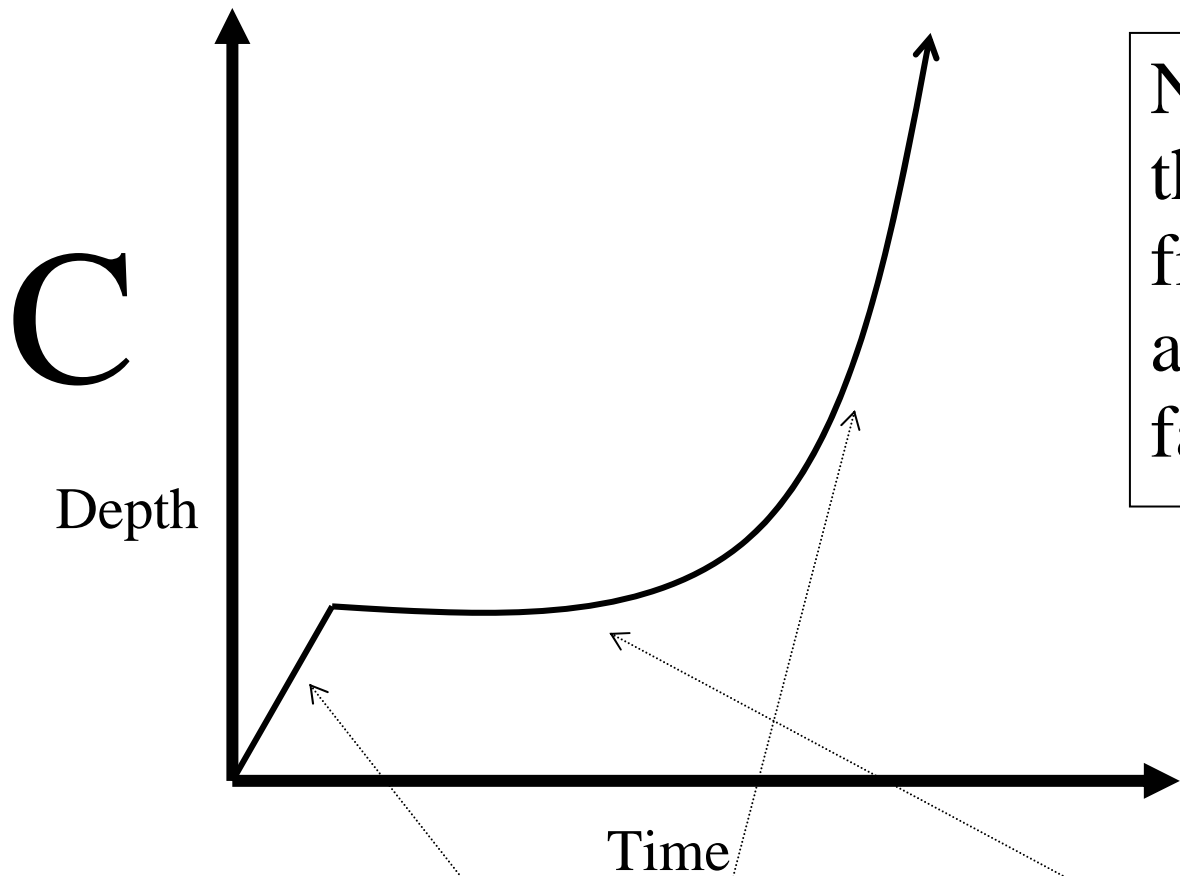
Leveling off



No. This graph shows the depth increasing fast and then leveling off slowly. This would happen if the rate of pouring were fast and then slow.

Leveling off

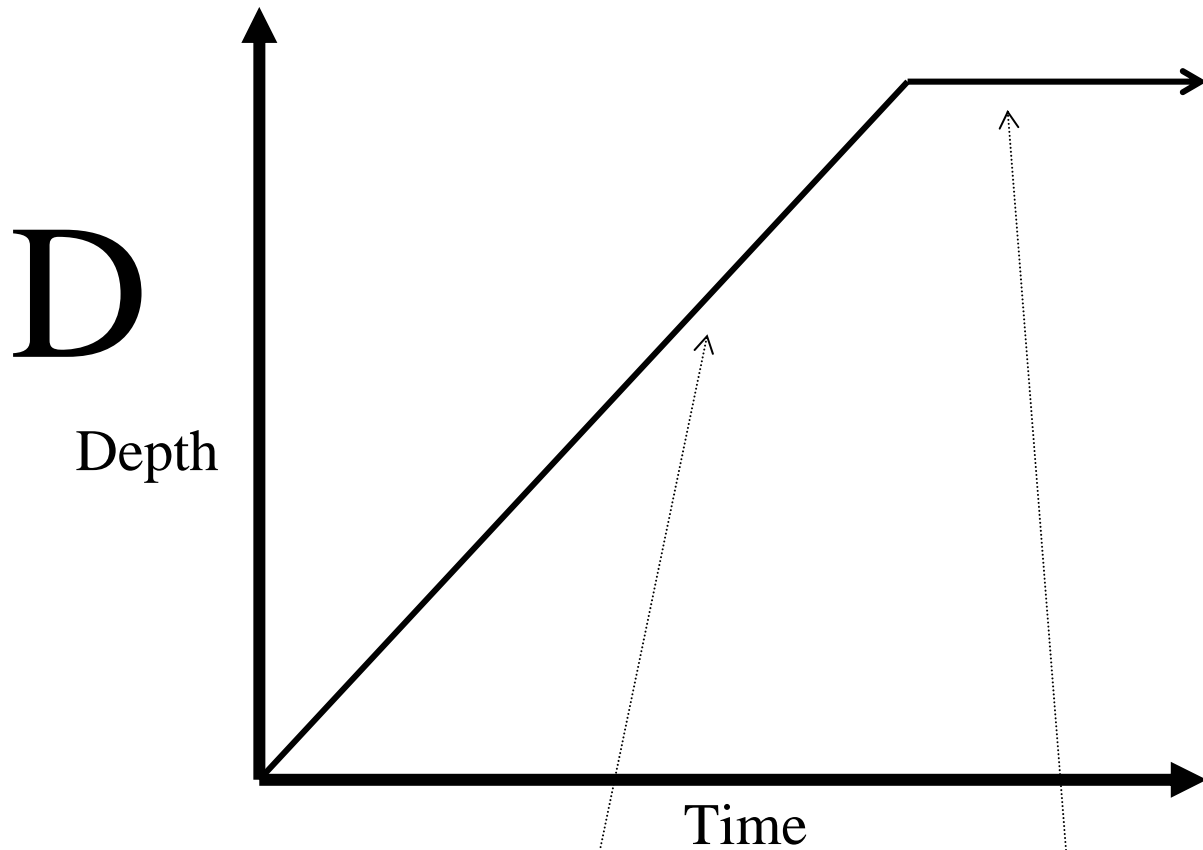
Fast increase



No. This graph shows the cylinder being filled fast, then not at all, and then gradually fast again.

Fast increase

Leveling off



Constant depth
increase

No more increase

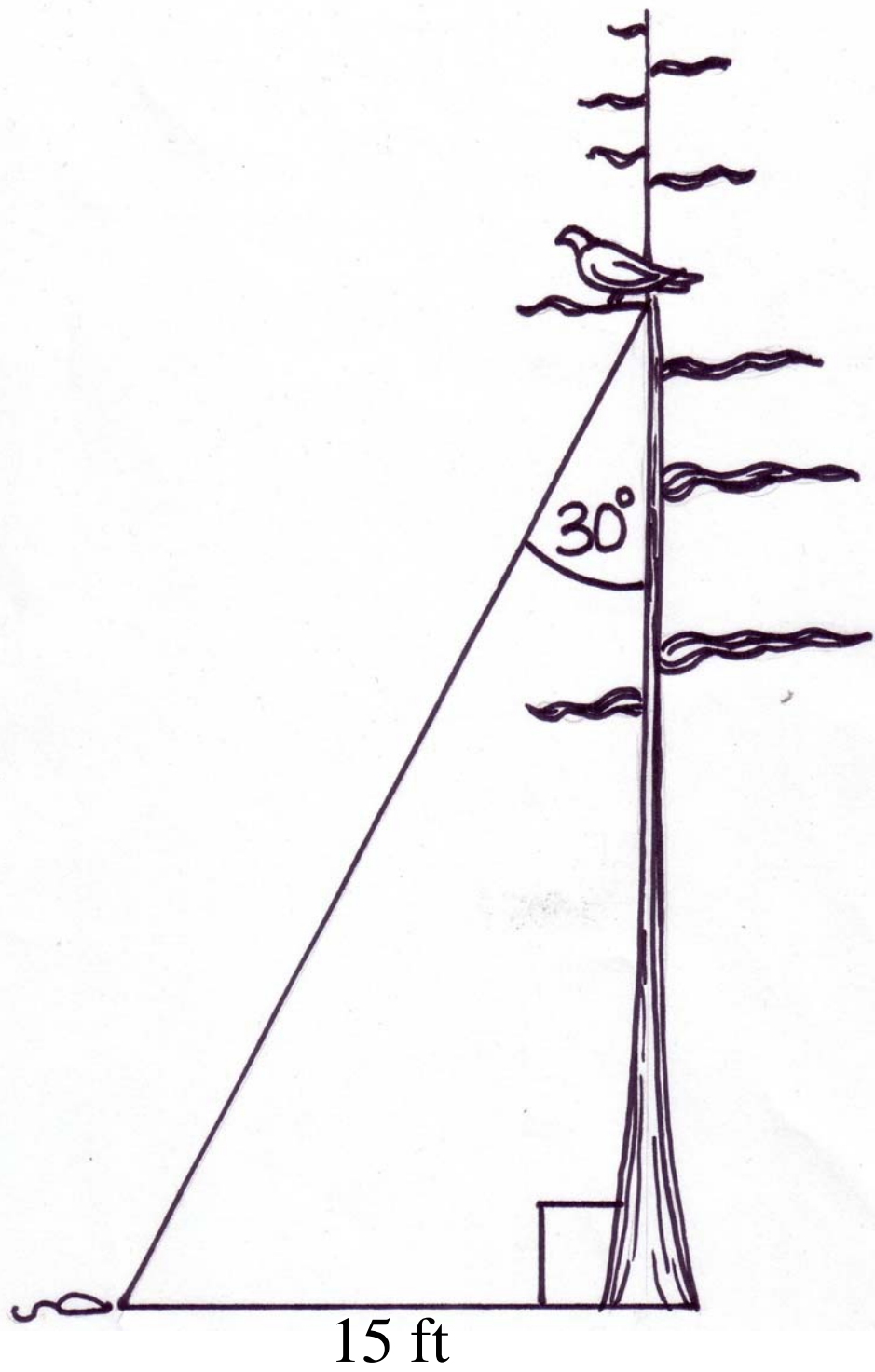
CORRECT RESPONSE.
This graph shows the depth increase at a constant rate, represented by a straight upward line. The flat line indicates when the water runs out, the cylinder's depth will no longer increase.

Problem of the Month: October

Problem of the Month: November

A hawk sitting on a tree branch spots a mouse on the ground 15 feet from the base of the tree. The hawk swoops down toward the mouse at an

angle of 30° . What is the distance from the tree branch to the mouse?



A 7.5 ft

B 15 ft

C $15\sqrt{3}$ ft

D 30 ft

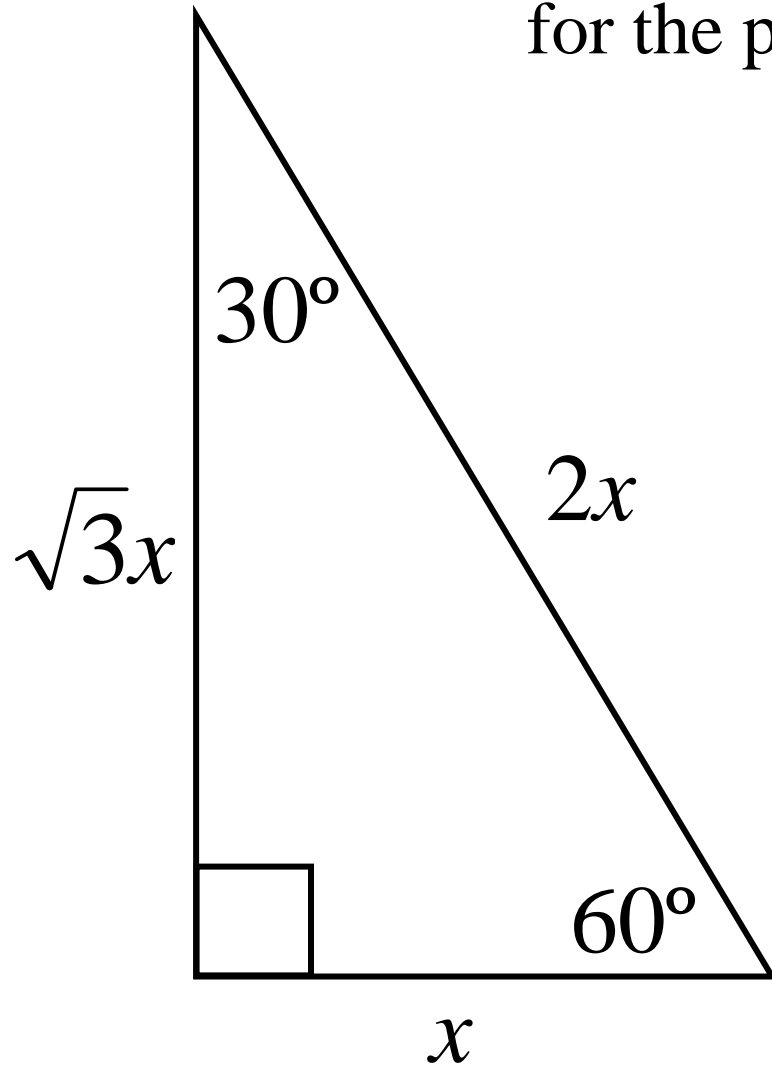
Lift here for the
answer and
explanation.

*...after you've
tried the problem
yourself!*

D is the correct response. The side opposite the 30° angle is given in the problem. Therefore, the hypotenuse will be double this amount.

Important!!

You need to memorize the following right triangle information for the proficiency exam!



If given the hypotenuse length, you'd find the bottom side by cutting the hypotenuse in half. To find the other leg length of the triangle, multiply the bottom side length by $\sqrt{3}$

February Proficiency Problem

Mark and Jose have a combined weight of 270 pounds. Mark weighs 30 pounds less than twice Jose's weight. How much do Mark and Jose weigh?

A Mark weighs 170 pounds and
Jose weighs 100 pounds

B Mark weighs 165 pounds and
Jose weighs 105 pounds

C Mark weighs 145 pounds and
Jose weighs 125 pounds

D Mark weighs 135 pounds and
Jose weighs 135 pounds

E Mark weighs 120 pounds and
Jose weighs 150 pounds

The sentence “Mark and Jose have a combined weight of 270 pounds” can be written as a math sentence:

$$\text{Mark} + \text{Jose} = 270$$

The sentence “Mark weighs 30 pounds less than twice Jose’s weight” can also be written as a math sentence:

$$\text{Mark} = 2 \times \text{Jose} - 30$$

If Mark weighs 30 pounds LESS than twice Jose, we would first multiply Jose’s weight by 2, then subtract 30 pounds.

Let's look at the first one:

$$\text{Mark} + \text{Jose} = 270$$

Let's subtract Jose's weight from both sides of the equation

$$\begin{array}{r} \text{Mark} + \text{Jose} = 270 \\ - \text{Jose} \quad - \text{Jose} \end{array}$$

Now we have:

$$\text{Mark} = 270 - \text{Jose}$$

The line is drawn through + Jose
- Jose
because this has a sum of zero. Just like $1 - 1 = 0$ or $1 + -1 = 0$

Look at them together:

$$\text{Mark} = 270 - \text{Jose}$$

$$\text{Mark} = 2 \times \text{Jose} - 30$$

Let's use just M for Mark and J for Jose:

$$M = 270 - J$$

$$M = 2J - 30$$

In algebra, $2 \times \text{Jose}$ is written $2J$.

Now we'll use substitution:

$$270 - J = 2J - 30$$

Since M *equals* $270 - J$, we can replace the M in the 2nd equation with $270 - J$.

Combine like terms:

$$\begin{array}{r} 270 - J = 2 - 30 \\ +30 \qquad \qquad \qquad \cancel{+30} \end{array}$$

After adding, we get:

$$300 - J = 2J$$

Combine like terms again:

$$\begin{array}{r} 300 - \cancel{J} = 2J \\ \qquad \qquad \qquad \cancel{+J} \quad \quad +J \end{array}$$

In algebra, when you see a variable like J, it really means $1 \times J$ or $1J$, but we don't ever write the 1. So, $2J + J$ equals $3J$.

After adding, we get:

$$300 = 3J$$

This math sentence means “3 times what number (J) is equal to 300.” To get the answer, we divide both sides by 3.

$$\frac{300}{3} = \frac{\cancel{3}J}{\cancel{3}}$$

The 3's are canceled because $\frac{3}{3}$ equals 1.

After dividing we get:

$$100 = J$$

This means that Jose weighs 100 pounds.

The only choice that has Jose weighing 100 pounds is choice **A**.

Take a question...

Your teacher may give
you extra credit for
solving it!

(Show all work)

Christine and Emily have a combined weight of 285 pounds.
Christine weighs 15 pounds more than half of Emily's weight.
How much do Christine and Emily weigh?

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Christine weighs 15 pounds more than half of Emily's weight.
How much do Christine and Emily weigh?

March Proficiency Problem

A formula used to
determine a person's arm
strength (S) is:

$$S = (d + p) \left(\frac{w}{10} + h - 60 \right)$$

d = dips on a parallel bar

p = pull-ups

w = weight in pounds

h = height in inches

If Helga, who is 66 inches tall and weighs 140 pounds, can do 5 dips and 7 pull-ups, what is her arm strength?

A. 240

B. 174

C. 151

D. 50

E. 40

The problem gives us all of the values to plug in, and asks us to find S .

$$S = (d + p) \left(\frac{w}{10} + h - 60 \right)$$

d = dips on a parallel bar

p = pull-ups

w = weight in pounds

h = height in inches

Problem tells us that Helga can do 5 dips.

And that Helga can do 7 pull-ups.

And that Helga weighs 140 pounds.

And finally, that Helga is 66 inches tall.

Plug in the values for the variables:

Problem tells us that Helga can do 5 dips.
 $d = 5$

And that Helga can do 7 pull-ups.
 $p = 7$

And that Helga weighs 140 pounds.

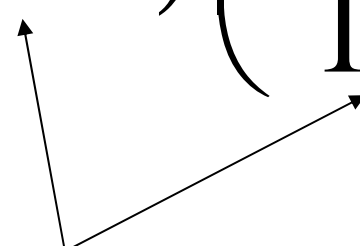
And finally, that Helga is 66 inches tall.
 $h = 66$

$$(5 + 7) \left(\frac{140}{10} + 66 - 60 \right)$$

The 10 and the 60 were a part of the original formula:

$$(d + p) \left(\frac{w}{10} + h - 60 \right)$$

Now we evaluate the expression:

$$(5 + 7) \left(\frac{140}{10} + 66 - 60 \right)$$


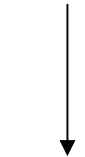
Two parentheses next to each other means to multiply. First we do what's inside each.

First set of parentheses:

$$(5 + 7) = 12$$

Second set of parentheses:

$$\frac{140}{10} + 66 - 10$$



$$14 + 66 - 60$$

$$80 - 60$$

$$20$$

Now we can multiply:

$$(12)(20) = 240$$

Helga's arm strength is 240, answer "A"

Take a question...

Your teacher may give you extra credit for solving it!
(Show all work)

Frank is 70 inches tall and weighs 180 pounds. He can do 7 dips and 10 pull ups. Find his arm strength.

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Frank is 70 inches tall and weighs 180 pounds. He can do 7 dips and 10 pull ups. Find his arm strength.

December Proficiency Problem

Miranda has a gift-wrapping business. She has 15 types of paper, 10 types of ribbon, and 12 different bows. Which expression represents the

number of different
combinations of paper,
ribbon, and bows
available?

A $15 + 10 + 12$

B $15 + 10 + 12$

C $10(15 + 12)$

D $12(15 + 10)$

E $15 \times 10 \times 12$

When you want to find the number of combinations of something, you multiply. The answer is E... $15 \times 10 \times 12$.

Here is an example with smaller numbers:

How many lunch combinations could we make with 2 sandwich types (ham or turkey), 3 side dishes (chips, salad, or vegetables), and 3 desserts (cookie, brownie, or pudding)?

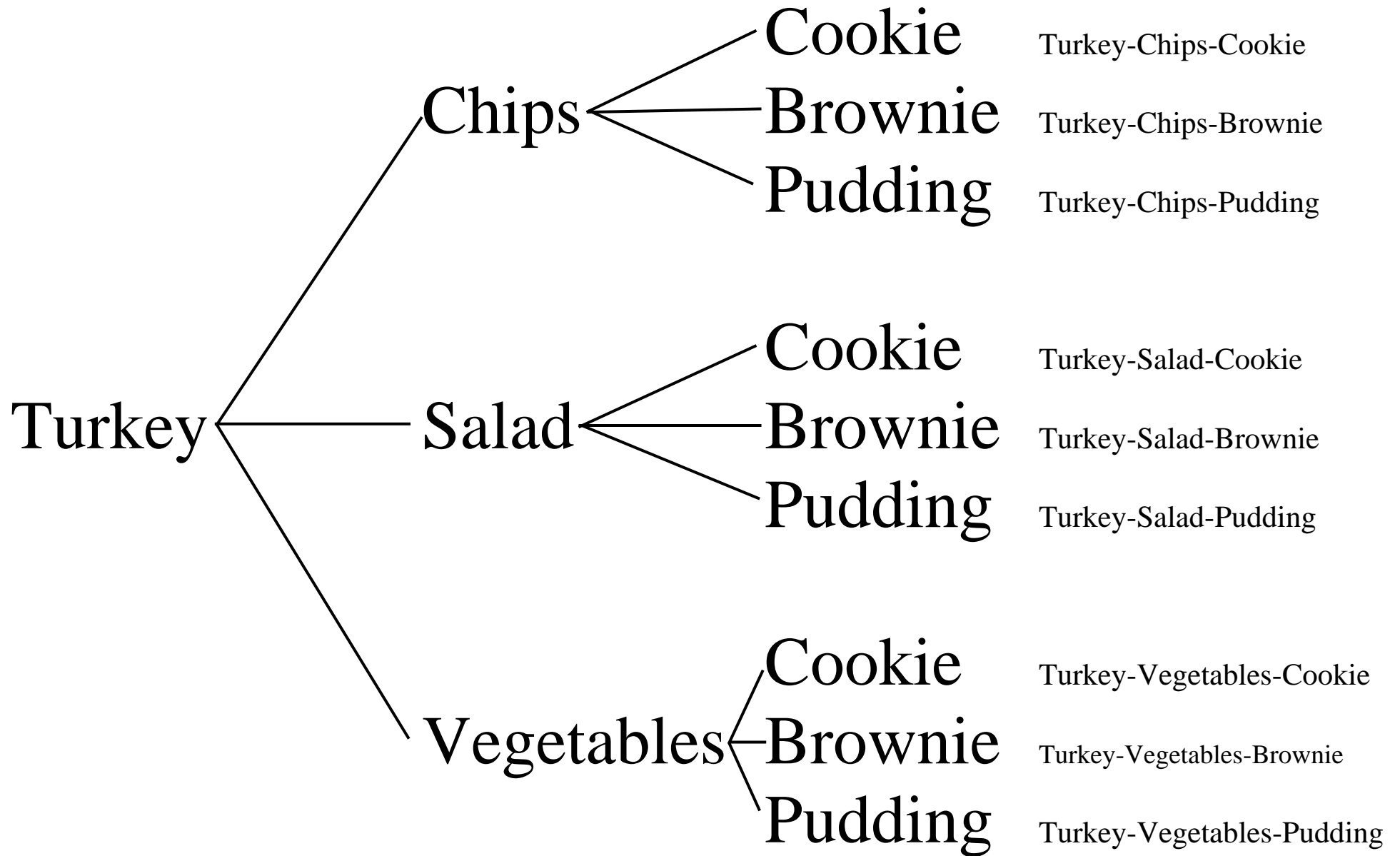
The tree diagram shows all of the possibilities:

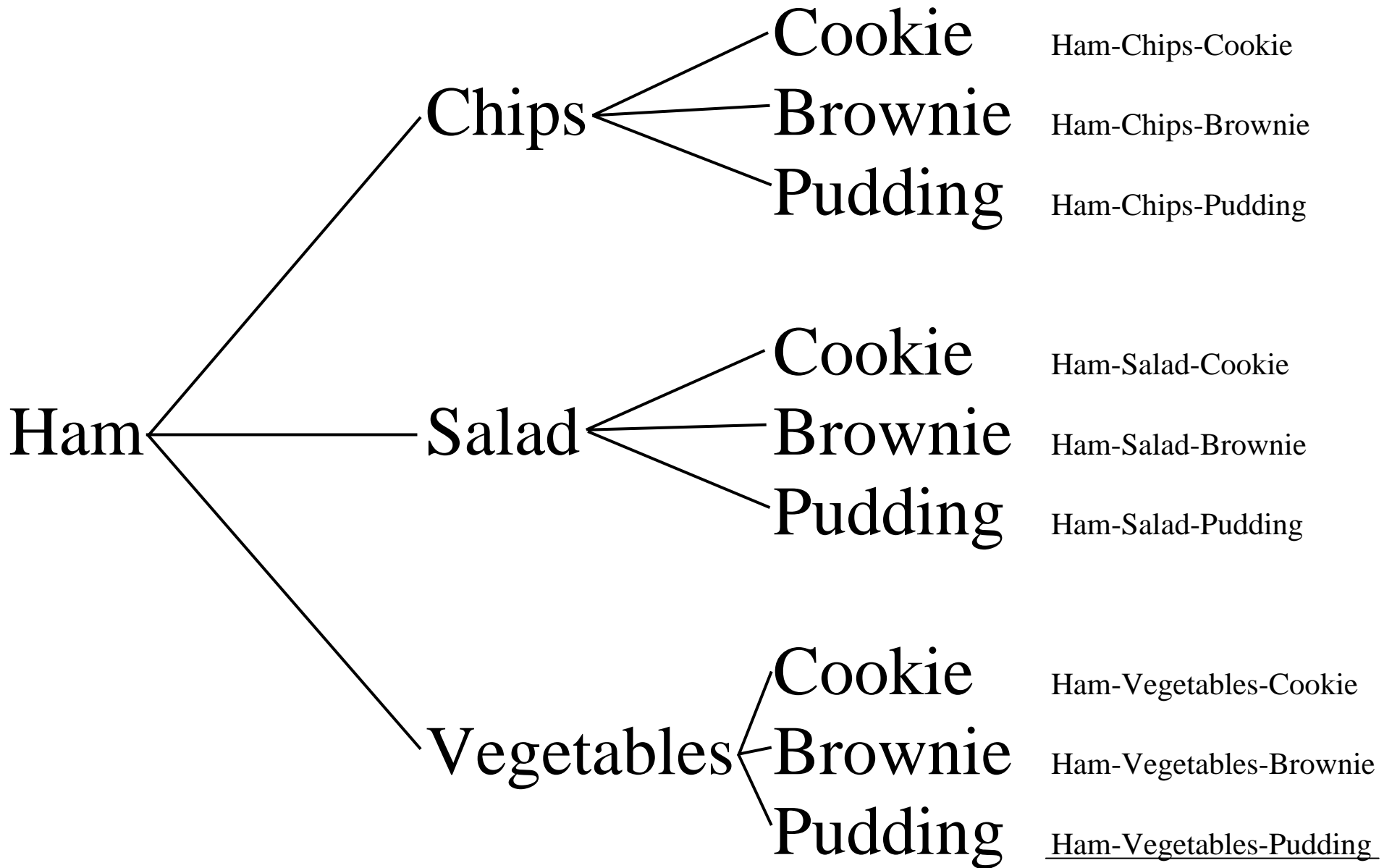
Sandwich

Side

Dessert

Combinations





18 Total Lunch Combinations

2 Choices

Turkey or Ham

2

×

3 Choices

Chips, Salad, Vegetables

3

×

3 Choices

Cookie, Brownie, Pudding

3

=

18